

## Shared interests or sexual conflict? Spousal age gap, women's wellbeing and fertility in rural Tanzania

### HIGHLIGHTS

We explore whether husband-older spousal age gaps are costly or beneficial to women

Women frequently married older men than their stated ideal spousal age gaps

Spousal age gap was unrelated to the risk of divorce or to women's fertility

Overall, women's wellbeing was highest in husband-older marriages

However, among women married to older men, spousal age gap was unrelated to wellbeing

# Shared interests or sexual conflict? Spousal age gap, women's wellbeing and fertility in rural Tanzania

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## ABSTRACT

The marriage of older men to younger women is common across cultures. On one hand, husband-older marriage may serve the interests of both sexes, a conclusion broadly consistent with reported gender differences in mate preferences. On the other hand, men alone may benefit from such marriages at a cost to women if seniority enables men to exert dominance in conflicts of interest. Indeed, in public health large spousal age gaps are generally deemed “pathological”, both a cause and consequence of gender inequalities harmful to women. We investigate these alternative models of spousal age gap using data from a cross-sectional survey of women in Mwanza, northwestern Tanzania (n=993). Consistent with the notion that spousal age gaps are a product of sexual conflict, women typically married with a larger age gap than stated ideals. However, adjusting for potential confounds, spousal age gap was not associated with fertility or the risk of divorce. Furthermore, women's mental health and autonomy in household decision-making was higher in husband-older marriages compared to rare cases of same-age or wife-older marriage. Beyond this comparison, the magnitude of spousal age gaps was unrelated to either measure of women's wellbeing among the overwhelming majority of marriages where the husband was older. Together these findings suggest husband-older marriage does not influence marital stability, relatively large spousal age gaps are neither especially costly nor beneficial to women, and that alternative sociodemographic factors are more important in driving variation in women's wellbeing and reproductive success in this context. Our results support neither a model of mutual benefits, nor a “pathological” conceptualization of spousal age gaps. We conclude by both encouraging evolutionary human scientists to engage more fully with models of sexual conflict in future studies of marriage and mating, and suggesting that public health scholars consider more neutral interpretations of spousal age differences.

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**KEYWORDS**

Spousal age difference; empowerment; mental health; marriage; Tanzania; sexual conflict

## 1. Introduction

One of the most stable aspects of human marriage across cultures is the tendency of older men to marry younger women. The magnitude of spousal age gaps is variable, but it is normative everywhere for husbands to be older than their wives (Carmichael, 2011; Casterlinet, Williamst, & Mcdonald, 1986; Conroy-Beam & Buss, 2019). Within the evolutionary behavioral sciences, and to some extent economic perspectives on marriage more generally (Bergstrom & Bagnoli, 1993; Gustafson & Fransson, 2015), this pattern has long been interpreted as serving the interests of both sexes. Men prefer young women because female youth is closely associated with reproductive value, while women prefer older men because male wealth and social status tend to increase with age. Supporting evidence for this interpretation comes from numerous mate choice studies where men state a preference for younger women, while women state preferences for older men (Buss, 1989; Conroy-Beam & Buss, 2019; Kenrick & Keefe, 1992). Although less commonly studied, there is also some evidence that the reproductive success of a marriage is higher when the husband is older than the wife (Fieder & Huber, 2007; Helle, Lummaa, & Jokela, 2007; Kuna, Galbarczyk, Magdalena, Nenko, & Jasienska, 2018; but see Stoeckel & Chowdhury, 1984, Rotering & Bras, 2019).

While cross-culturally common, mating preferences for relatively older males and younger females may be derived rather than ancestral traits for our species, evolving in tandem with our distinct tendency among apes for paternal care and the truncation of female fecundity by menopause. Wild chimpanzee males, for example, prefer older females as mates, most likely due to their higher social rank, and experience as mothers (Muller, Thompson, & Wrangham, 2006). There is also evidence for context-dependency in human spousal age gaps and in age preferences. Among the richest and most gender equal societies the mean spousal age gap approaches zero (Carmichael, 2011). Furthermore, Eagly and Wood's (1999) reanalysis of Buss's (1989) landmark cross-cultural mate choice study demonstrates that women's preferences for older men are weaker among societies with greater gender equality. Within populations, there is also evidence that individual socioeconomic status influences women's age

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4 preferences, although the direction of reported effects is mixed (Moore, Cassidy, &  
5 Perrett, 2010; Moore, Cassidy, Smith, & Perrett, 2006). This demonstration of  
6 variability has sometimes been taken as a challenge to the idea of universal evolved  
7 sex differences in ideal partner age. However, evolutionary perspectives anticipate  
8 context-dependency in behavioral strategies and preferences (Nettle, Gibson,  
9 Lawson, & Sear, 2013; Smith, Borgerhoff Mulder & Hill 2001). Women with  
10 independent wealth, for example, may benefit relatively little from partnering with  
11 older men, and where local reproductive strategies prioritize offspring quality over  
12 quantity (Lawson & Mace, 2011, Mace 1998), female youth as a proxy for reproductive  
13 value will logically be a lower priority for men.  
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24 A more relevant challenge to the view that observed spousal age gaps serve the  
25 mutual interests of men and women is raised by considering scope for sexual conflict  
26 over ideal partner characteristics (Borgerhoff Mulder & Rauch, 2009). Indeed,  
27 although rarely approached from an evolutionary perspective, a large public health  
28 and applied social science literature is premised on the view that husband-older age  
29 gaps reinforce power inequalities between the sexes, enabling men to dominate  
30 younger women and restrict women's autonomy (Barbieri, Hertrich, & Grieve, 2005;  
31 Girls Not Brides, 2019; Carmichael, 2011; Clark, Bruce, & Dude, 2006; UNFPA, 2012)  
32 with potentially harmful consequences. Here, women are viewed as effectively forced  
33 or manipulated into husband-older marriages by patriarchal systems that restrict their  
34 marital options, and it is assumed that if given free choice women would not opt to  
35 marry significantly older men (UNFPA, 2012). A link between large spousal age gaps  
36 and divorce could support such a view (e.g. Francis-Tan & Mialon, 2015), but evidence  
37 linking age gaps to wellbeing is inconsistent (Adebowale, 2018; Kim, Park, & Lee,  
38 2015; Kishor & Johnson, 2005; Otieno, 2017), a point we return to below when  
39 discussing results of the present study (Section 4.3). Confusing matters further, many  
40 public health studies of spousal age gaps also rely on national datasets (such as the  
41 Demographic and Health Surveys) which prioritize the generation of representative  
42 statistics at aggregated levels (i.e. country, sub-region), rather than within-  
43 community comparisons. Consequently, they are particularly vulnerable to  
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4 confounding marriage patterns with alternative sociodemographic determinants of  
5 wellbeing at the individual and ecological level (for discussion see: Lawson et al.,  
6 2015, Lawson & Gibson 2018). More studies comparing outcomes for women (and men)  
7 with different spousal age gaps from within the same local cultural context are  
8 needed.  
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14 In this study, we explore evidence for sexual conflict over spousal age gap using data  
15 from a cross-sectional survey of women's marital history and wellbeing in Mwanza  
16 Region, northwestern Tanzania. Our analyses are designed to test the hypothesis that  
17 relatively large husband-older age gaps are undesirable and costly to women. First,  
18 we predict that women will not realize their ideal age gap preferences and  
19 consequently frequently marry with a larger age gap than their stated ideals. Second,  
20 we predict that marriages where the husband is relatively older will be especially  
21 prone to marital conflict and thus greater husband-older age gaps will increase risk of  
22 separation or divorce. This prediction notably rests on the assumption that women are  
23 able to leave unhappy marriages, which may not be true in all contexts. Third, we  
24 predict that, all else equal, women with relatively older husbands will suffer from  
25 poorer wellbeing. Here, we focus on two outcomes: presence of depressive symptoms,  
26 as a measure of mental health, and household decision-making authority, a commonly  
27 used indicator of women's empowerment. Finally, we consider the relationship  
28 between spousal age gap and age-adjusted fertility as an indicator of female  
29 reproductive success. Here, our analysis is best considered exploratory rather than  
30 predictive. Lower fertility might be disadvantageous for female fitness, but past  
31 research has also suggested that men can benefit more from higher fertility than  
32 women given that women pay the biggest physiological costs of reproduction  
33 (Borgerhoff Mulder & Rauch, 2009; but see Moya, Snopkowski, & Sear, 2016).  
34 Moreover, since the study population is urbanizing we anticipate that reproductive  
35 strategies are in flux for both sexes, with ideals of relatively lower fertility and higher  
36 parental investment increasingly adopted (Hedges, Sear, Todd, Urassa, & Lawson,  
37 2018). Nevertheless, differences in women's fertility by spousal age gaps may inform  
38 our understanding of the scope for and consequences of sexual conflict.  
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4 We caution from the outset that marriage and gender norms demonstrate  
5 considerable cultural variation. Consequently, we explicitly do not claim that the  
6 results from this study will be generalizable to alternative settings, even within  
7 Tanzania which encapsulates considerable cultural, demographic and socioeconomic  
8 diversity. As described below, in this population divorce and remarriage are  
9 commonplace and women report autonomy in partner choice. As such men's ability to  
10 dominate women may be limited compared to contexts where marriages are  
11 commonly arranged and divorce is not an option. On the other hand, bridewealth is  
12 practiced, suggesting that women's wellbeing may be traded for financial gain of  
13 wider kin. Finally, and perhaps of particular importance, the population is vulnerable  
14 to food insecurity and economic precarity which may, in contrast to wealthier  
15 settings, ultimately render marital relations a relatively trivial determinant of both  
16 perceived and objective wellbeing.  
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## 29 2. Materials and methods

### 30 2.1 Study population

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33 Our data come from a larger project on marriage and wellbeing in northwestern  
34 Tanzania (Schaffnit, Hassan, Urassa, & Lawson, 2019; Schaffnit, Urassa, & Lawson,  
35 2019). Data collection was carried out within the infrastructure of the ongoing Magu  
36 Health and Demographic Surveillance System (HDSS) managed by the Tanzanian  
37 National Institute for Medical Research (NIMR). The study area (Kisesa Ward) is  
38 predominantly rural, located approximately 20 kilometers east of Mwanza city, and  
39 home to over 35,000 people (Kishamawe et al., 2015). The population are primarily  
40 Sukuma, combining agropastoralist livelihoods with varying degrees of wage labor,  
41 especially in more urban communities. Education levels are rising, and girls'  
42 education is increasingly prioritized among families (Hedges et al., 2018).  
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55 Marriage is an important social institution, widely viewed as instrumental in acquiring  
56 social status within one's local community and practiced near universally (Schaffnit,  
57 Urassa, et al., 2019). Marriages are marked by cohabitation, but not necessarily a  
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4 ceremony or clear marriage event. In formal marriages (those with a legal, religious  
5 and/or traditional ceremony), bridewealth is generally exchanged at marriage, while  
6 informal marriages (those with no ceremony) are often followed by a “compensation”  
7 transferred from a husband to his parents-in-law, effectively serving as a late  
8 bridewealth (see also Kudo, 2015). Although we did not collect data on the reasons  
9 behind differences in the formality of marriage, our general understanding is that  
10 informal marriages are more common when bridewealth cannot be afforded and/or  
11 the couple marry without parental approval. Both forms of relationship are fully  
12 accepted as marriage in the community. Divorce is commonplace, and usually  
13 followed quickly by remarriage, at least for relatively young women (Boerma et al.,  
14 2002). Polygyny is practiced with approximately 10-20% of adult men married to more  
15 than one woman (Hedges, Sear, Todd, Urassa, & Lawson, 2019). It is common for  
16 women to have children prior to and outside of marriage (Schaffnit, Urassa, et al.,  
17 2019) and childcare arrangements often involve extended kin, with high rates of  
18 fostering, especially with grandparents (Hedges, Sear, Todd, Urassa, & Lawson, 2019).  
19 Female autonomy in the marriage process appears high; almost all married women  
20 sampled reported having chosen their own spouse, while unmarried women reported  
21 that they expected to choose who and when to marry (Schaffnit, Urassa, et al., 2019).  
22 Young women however are rarely economically-independent and usually remain living  
23 with their kin prior to marriage and following divorce.  
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## 42 2.2 Survey design

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45 Cross-sectional surveys were conducted in two communities within the HDSS from July  
46 through October of 2017. These communities were chosen to represent the extremes  
47 of the rural-urban gradient within Kisesa Ward, facilitating comparisons between the  
48 more agricultural and market-integrated ecologies within the study site. The more  
49 urban area is hereafter referred to as the town, and the more rural area as the  
50 village. As a mixed, urbanizing economy it is particularly challenging to identify  
51 singular dimensions of wealth or social status. Land or cattle ownership, for example,  
52 poorly captures wealth variation because many households rely primarily on wage-  
53 labor rather than farming. Conversely, material asset scores favor ‘urban’ wealth over  
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4 wealth more common amongst farmers (i.e. livestock and land) (see Lawson et al.  
5 2015). However, food security is a concern for all families, and is measured here using  
6 the Household Food Insecurity Access Scale which assesses food insecurity during the  
7 last month (Coates, Swindale, & Bilinsky, 2007).  
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12 Households containing at least one 15 through 35-year-old girl/women were selected  
13 for interview, by simple random sampling, using the 2016 HDSS census as a sampling  
14 frame. This age range was chosen based on our wider project aims of sampling both  
15 married and unmarried women/girls, with approximately 35% marrying before age 18  
16 years in this population (Schaffnit et al 2019). Note, for simplicity, throughout we use  
17 the collective term “women” to refer to participants between these ages while  
18 acknowledging that many may be considered girls or adolescents, and that boundaries  
19 between childhood and adulthood are culturally variable (Dixon-Mueller 2008,  
20 Schaffnit, Urassa et al. 2019). Originally, we aimed to sample approximately 900  
21 women, based on budget and time constraints, along with sample size calculations  
22 concerning our original variable of primary interest (age at marriage). Ultimately, we  
23 approached 1,254 households, and successfully conducted surveys at 743 households  
24 and with 993 women. Due to high-levels of movement, many households drawn from  
25 the HDSS were ineligible, typically due to outmigration of the woman herself, or less  
26 commonly, full household migration. However, once contacted, participation was  
27 near universal, with less than 1% of women refusing to participate. Participation was  
28 voluntary and no payment was made. However, broader NIMR activities support local  
29 health care services in the study area, leading to a good relationship between NIMR  
30 and community members.  
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48 Parental/guardian consent and participant assent was obtained for minors, and  
49 participant consent was obtained from adult participants prior to interview.  
50 Participants were read a consent statement which outlined the study’s goals and risks  
51 and benefits of participation. Following this, participants were allowed time to ask  
52 questions (or decline participation) and were given a hard copy of this statement  
53 along with contact information for representatives of NIMR should they have questions  
54 or concerns arising at a later time. Interviews were first conducted with household  
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4 heads (n=743; 78% male) to gather information on household membership,  
5 socioeconomic status and livelihoods; this interview lasted approximately 30 minutes.  
6 Interviews were then conducted privately with all appropriately-aged, resident  
7 women, lasting up to our hour. Women’s surveys (n=993) included questions on their  
8 marital and birth histories, and our measures of wellbeing (see below). We asked  
9 about marriages in chronological order, starting with their first. For ever-married  
10 women, information was collected for up to 3 current/past husbands - including both  
11 formal and informal marriages. This was sufficient to gather complete relationship  
12 histories in most cases; only 4 women had had 3 husbands, and of those only 2 had  
13 since separated from their 3<sup>rd</sup> husband. Of the 502 ever married women, 69.7%  
14 (n=350) were still married to that original partner, 11.1% (n=56) were married to  
15 someone else and the remainder were currently unmarried. Ethical approval for this  
16 research was granted by the University of California, Santa Barbara (Human Subjects  
17 Committee #1-17-0405) and NIMR (Lake Zone IRB #MR/53/100/463).  
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### 32 2.3 Ideal and actual spousal age gap 33 34

35 Ideal spousal age gap was calculated from two variables. All women were asked  
36 “What is the ideal age for a man to marry for the first time (in years)?” and “What is  
37 the ideal age for a woman to marry for the first time (in years)?” We refer to the  
38 difference between these two responses as the “ideal spousal age gap”. This is  
39 different from previous studies which have asked more directly what the age  
40 differences of spouses should be, or about women’s preferences for the age of a  
41 potential spouse for themselves. As such, we interpret this variable as representing  
42 women’s ‘societal ideal’ for age gaps as opposed to an individual preference for their  
43 own potential mate. Three outlying responses were dropped due to unrealistically  
44 large age gaps, likely the result of recording errors during data collection, leaving 990  
45 valid responses.  
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57 Actual spousal age gaps were calculated for each previous or current partner and can  
58 be sub-divided into first (n=502 women had ever married), and current marriages  
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4 (n=417 women currently married). Spousal age gaps were calculated from two  
5 variables. Women were asked “How old were you when you married this man?” and  
6 “How old was your husband at the time of the marriage?” Women who did not know  
7 their own or their husband’s actual age, were asked to make their best estimate. The  
8 difference between these two variables is used as their actual spousal age gap. Some  
9 women did not know their partner’s age at marriage and were unable to confidently  
10 guess; this resulted in a sample of 495 ever married and 412 currently married women  
11 with information on their actual spousal age gaps. For both ideal and actual spousal  
12 age gaps, negative numbers represent wife-older marriages, while positive numbers  
13 represent husband-older marriages.  
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## 24 2.4 Women’s wellbeing and fertility

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27 Women’s current wellbeing was captured by two composite measures assessing  
28 mental health and autonomy in household decision-making (see **Supplementary**  
29 **Materials** for individual questions making up each summary score). Mental health was  
30 evaluated using a modified version of the Hopkins Symptoms Checklist (Hadley &  
31 Patil, 2006), which specifically focuses on depressive symptoms. Women were asked  
32 to specify whether they had experienced various symptoms. They could respond “not  
33 at all”, “a little”, “some” or “a lot”; scores were reverse coded such that low values  
34 represent poorer mental health. Autonomy in household decision making was  
35 captured through a series of questions about who made decisions in various spheres  
36 within the household (CARE, 2008). Women could respond that the decisions were  
37 made by themselves, their husband, their parents, their parents-in-law, or together  
38 with their husband. Women with higher “empowerment scores” made more decisions  
39 on their own or with their husband and are considered to have high empowerment.  
40 Each of these outcomes are standardized for the full sample of women (i.e. including  
41 unmarried women) so that 0 is equal to the sample mean, and 1 unit is equal to 1  
42 standard deviation. Finally, age-adjusted fertility was calculated from the residuals of  
43 a linear regression predicting number of living children with current age. The  
44 resultant value can then be interpreted as how many more (positive values) or fewer  
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4 (negative values) living children each woman has, compared to what would be  
5 predicted for her age.  
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## 8 9 2.5 Analysis strategy

10 We first describe and compare the distributions of ideal and actual spousal age gaps.  
11 We then contextualize our understanding of marriage patterns by testing for bivariate  
12 relationships between actual spousal age gap and a range of potential correlates, as  
13 measured by our surveys. Here we divide between two broad categories of variables.  
14 First, '*structural and demographic variables*' include village or town residence, a  
15 household-level measure of socioeconomic status (household food insecurity,  
16 described above), women's current age and education (level completed), and  
17 household religion. Because structural and demographic data are relevant only to the  
18 time of interview (i.e. we do not have retrospective data on these measures)  
19 bivariate relationships were only considered for current marriages. Second, among  
20 ever-married women (i.e. currently and previously married women), we also consider  
21 relationships between spousal age gap and other '*union-level variables*' for first and  
22 current relationships; note that 70% of ever-married women were still married to  
23 their first partner, so there is overlap between these two groups. Union-level  
24 variables include wife number (comparing monogamously married women, first wives  
25 of polygynous men, and later wives of polygynous men), age at marriage, who the  
26 woman reports chose her husband, whether or not the marriage included an exchange  
27 of bridewealth, and the husband's relative wealth and education at the time of their  
28 marriage. Relative wealth here is a woman's own subjective comparison of the wealth  
29 of the woman's household prior to marriage, compared to her husband. We highlight  
30 that both wife number and receipt of bridewealth variables are based only on current  
31 status; currently monogamous marriages may later become polygynous (and vice  
32 versa), and bridewealth transfers can be delayed. Both variables were also recorded  
33 for formal marriages only. As such, informal marriages are excluded from bivariate  
34 analyses with these two variables, while multivariate models include a binary variable  
35 for formal vs informal marriage. For union-level variables, bivariate relationships  
36 between participant characteristics and spousal age gaps are presented for both first  
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4 and current marriages. We use linear regression with spousal age gap as the outcome  
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6 to test each bivariate relationship, running a likelihood ratio test based on model fit  
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8 to obtain an overall p-value for each categorical predictor. We do not run hierarchical  
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10 models with women clustered within households because the mean number of women  
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12 surveyed per household was only 1.3 and Clarke (2008) has demonstrated that when  
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14 clusters are unbalanced and sparsely populated both fixed and random effects may be  
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16 overestimated.

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18 Next, we consider relationships between all union-level characteristics (including  
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20 spousal age gaps) and marital stability for first marriages. Women who had been  
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22 widowed (n=13) were excluded from these analyses. Bivariate relationships are  
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24 considered using a chi-squared test, followed by a multivariate logistic regression  
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26 predicting staying married, with spousal age gap as the primary predictor controlling  
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28 for potential confounders (i.e. union-level characteristics that are correlated with  
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30 both spousal age gap and staying married to a first husband). This is followed by an  
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32 examination of relationships between spousal age gap, women's wellbeing measures  
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34 and age-adjusted fertility. Here, information on only current partners was used  
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36 because the wellbeing data are relevant to time of interview only. After considering  
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38 bivariate relationships between wellbeing/fertility and structural, demographic and  
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40 union-level variables, multiple linear regression models were run predicting each  
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42 wellbeing/fertility outcome. Variables identified as possible confounders (i.e.  
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44 correlated with the wellbeing/fertility outcome and current spousal age gap) were  
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46 included in these models. A control for village was included in each model a priori, as  
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48 was participants' current age in the two wellbeing models.

### 49 3. Results

#### 50 3.1 Ideal versus actual spousal age gaps

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52 The majority of respondents felt that the ideal age at first marriage for men was  
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54 older than for women (76.6%), with 69.4% of women suggesting that a man should be  
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56 2-7 years older than a woman at first marriage (mean ideal age for women = 18.6  
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4 years, standard deviation(sd) = 2.5; mean ideal age for men = 22.0 years, sd = 4.1).  
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6 About a fifth of women said that the ideal age of marriage was the same for men and  
7 women (21.8%), while a small percentage of women suggested that either women  
8 should be older than men (1.6%) or men should be 8+ years older than women (7.2%)  
9 at the time of first marriage. Never-married women (n=488) preferred smaller age  
10 gaps than women who had ever married (n=502); with a mean ideal age gap of 3 years  
11 (sd = 3) versus 3.8 years (sd = 2.9) respectively (t(985)=-3.7, p<0.001). Among women  
12 who had ever married, actual spousal age gaps with first husbands were larger (mean  
13 = 7.0, sd = 5.1) than their ideal age gaps (mean = 3.9, sd = 3.1; t(462)=-11.6, p<0.001;  
14 **Figure 1; Supplementary Table 1**). These data support our first prediction, that  
15 women frequently marry relatively older men than stated ideals, with ideal age gaps  
16 about half the size of actual age gaps.  
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### 27 3.2 Variation in spousal age gaps

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29 For currently married women, we considered the relationship between age gaps and  
30 several structural and demographic variables: place of residence, household food  
31 insecurity (a measure of socioeconomic status), women's education, women's current  
32 age, and religion. These analyses were restricted to information using women's  
33 current relationships only (n=412) because the structural and demographic variables  
34 were applicable only to the time of interview. None of these variables were  
35 significantly related to women's current spousal age gap (**Table 1**).  
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44 Next, we considered bivariate relationships between spousal age gaps and union-level  
45 characteristics (**Table 2**). For first, but not current marriages, an earlier age at  
46 marriage was associated with larger spousal age gaps. For all marriages, age gaps  
47 were largest for later wives of polygynously married men, and smallest for first wives  
48 of polygynous men. For first marriages only, spousal age gaps are largest if the woman  
49 rated her husband as relatively poor compared to her family background. Otherwise  
50 husband's relative socioeconomic status was not associated with spousal age gaps.  
51 Spousal age gaps were larger for women who received bridewealth for current,  
52 although not first marriages. and for women whose husbands were chosen by someone  
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4 other than herself and/or her parent for all marriages. Whether a marriage was  
5 formal or informal was not associated with spousal age gap for either first or current  
6 marriages.  
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### 10 3.3 Marital stability

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14 If large husband-older age gaps are costly for women, then we anticipate higher levels  
15 of marital discord and ultimately a greater chance of separation or divorce with  
16 increasingly large spousal age gaps. Bivariate relationships between  
17 separation/divorce and union-level characteristics for first marriages indicate no  
18 relationship between probability of remaining married and spousal age gaps (**Table**  
19 **3**). However, other union-level characteristics were correlated to remaining married  
20 to a first husband. Women who were married monogamously had lower rates of  
21 separation than women married to polygynous men, as did women who had received  
22 bridewealth compared to those that had not, and those in formal compared to  
23 informal marriages. Finally, marriages were more stable when women were married  
24 to men who had higher education than themselves.  
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35 Based on these bivariate relationships, we built multivariate logistic regression  
36 models with staying married as the outcome (**Supplementary Table 2**). Once  
37 controlling for current age and probable confounders (i.e. union-level characteristics  
38 correlated with both staying married and spousal age gaps), spousal age gap remained  
39 uncorrelated with the odds of staying married (**Figure 2**). Consistent with bivariate  
40 trends, women had lower odds of staying married when they were in polygynous  
41 marriages compared to monogamous marriages (first wives vs. only wives: odds ratio =  
42 0.23,  $p < 0.001$ ; later wives vs. only wives odds ratio = 0.46,  $p = 0.03$ ), and when  
43 marriage was informal compared to formal (odds ratio = 0.30,  $p < 0.01$ ). Overall, these  
44 results indicate that while some characteristics of a marriage are important  
45 predictors of marital stability, spousal age gap itself is not.  
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### 60 3.4 Women's wellbeing and fertility



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4 We consider two aspects of wellbeing - empowerment in household decision making,  
5 and a measure of depressive symptoms as an indicator of mental health - with a  
6 sexual conflict model predicting lower wellbeing in marriages with relatively older  
7 husbands. Bivariate relationships between wellbeing and structural/demographic  
8 variables are presented in **Table 1**, and union-level characteristics in **Table 3**; these  
9 statistics are limited to current marriages as wellbeing is measured only at time of  
10 survey. There is no bivariate relationship between spousal age gap and the wellbeing  
11 outcomes, but wellbeing is correlated to other union-level characteristics. Women  
12 who are married at younger ages have lower empowerment than women married later  
13 (but see Schaffnit, et al. 2019 for dedicated multivariate analysis of age at marriage  
14 and women's wellbeing). Women who reported marrying relatively wealthier men also  
15 had higher empowerment scores. Mental health was better for women married to men  
16 with similar education levels and for women whose parents chose their husbands.  
17 Finally, formal marriage was associated with higher empowerment and better mental  
18 health than informal marriage.  
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33 **Figure 3** shows the raw relationships between spousal age gaps and both wellbeing  
34 measures, and adjusted coefficients for union-level variables from linear regressions  
35 controlling for age, village, and other potential confounders (i.e. union-level  
36 characteristics correlated with spousal age gap and outcome). Among the large  
37 majority of women married to older men, having an incrementally older husband did  
38 not predict empowerment (**Figure 3D**; **Supplementary Table 3**) or mental health  
39 (**Figure 3E**; **Supplementary Table 4**), but in the rare cases where a woman was older  
40 than her husband, she tended to have lower empowerment ( $\beta=-0.7$ ,  $p=0.02$ ) and  
41 worse mental health ( $\beta=-1.0$ ,  $p=0.01$ ) compared to women married to men 5-7 years  
42 older. Women married to similarly aged men also had lower mental health than  
43 women married to men 5-7 years older ( $\beta=-0.3$ ,  $p=0.04$ ). Independently of spousal age  
44 gap, we also observe that, while the overwhelming majority of women chose their  
45 own husband, those who stated that their parents chose their husband tended to have  
46 better mental health compared to women who chose their own partners ( $\beta=0.7$ ,  
47  $p=0.02$ ).  
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4 Finally, we tested for a relationship between spousal age gap and reproductive  
5 success, as measured by age-adjusted fertility, but found no relationship. Bivariate  
6 relationships are shown in **Table 3**. Age-adjusted fertility was higher for women who  
7 married at younger ages, were the first wife of a polygynous man, and were married  
8 to men chosen by their parents. **Figure 3** shows raw relationships between spousal  
9 age gaps and age-adjusted fertility, and adjusted coefficients for union-level variables  
10 from linear regressions controlling for village and other potential confounders  
11 (**Supplementary Table 5**). There is some suggestion that having a younger husband is  
12 linked to lower fertility, but this relationship is not significant to the 0.05 level.  
13 Mirroring bivariate findings, first wives in polygynous marriages tended to have higher  
14 fertility than monogamously married women ( $\beta=1.0$ ,  $p=0.001$ ), and women whose  
15 parents had chosen their husbands had higher fertility than women who chose their  
16 own husbands alone or with help ( $\beta=1.1$ ,  $p=0.006$ ).  
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## 29 4. Discussion

### 30 4.1 Are older husbands beneficial or costly to women?

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33 We document a widespread preference among Sukuma women for husband-older  
34 marriages. This finding is in line with focus group data from our qualitative work in  
35 the same population wherein participants described ideal ages of marriage as younger  
36 for women than men (Schaffnit, Urassa, et al. 2019; see also Nnko & Pool, 1997),  
37 along with age preferences recorded more generally across a diverse range of human  
38 populations (Conroy-Beam & Buss, 2019). However, actual age gaps are on average  
39 almost twice as large as ideal spousal age gaps, indicating that women frequently  
40 marry older men than stated ideals. It is unclear to what extent this finding is  
41 remarkable; despite a large literature on age preferences (Conroy-Beam & Buss,  
42 2019), we are not aware of prior studies considering (a)synchrony between ideal and  
43 actualized spousal age gaps. Supporting the notion of conflicting age gap preferences,  
44 we find that particularly large spousal age gaps are most common when women's  
45 marriage partners were chosen by neither the woman or her parents. Such marriages  
46 are likely arranged by extended kin, who are likely to be relatively less concerned  
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4 with the woman's wellbeing. Age gaps are also larger when bridewealth transfers are  
5 made, suggesting that financial compensation may be required to make marriage to  
6 much older men desirable or at least tolerable to women. However, a lack of clear  
7 relationships of spousal age gap with food security, or husband's relative wealth and  
8 education, suggests socioeconomic patterns of mate choice are more nuanced than  
9 men simply trading wealth for female youth. This may be because, in this urbanizing  
10 context, higher socioeconomic status may also alter women's earning potential and  
11 educational attainment, rendering youth less fundamental to their perceived 'value'  
12 on the mating market. Male education may also shift gender norms away from  
13 traditional values that prioritize female youth in marriage partners.  
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23 A discrepancy between ideals and actual age differences is consistent with sexual  
24 conflict over spousal age gap, but is itself not diagnostic evidence. Further evidence  
25 of sexual conflict over spousal age gaps could come from a link between large gaps  
26 and divorce indicating acrimony between spouses, or a demonstration that women  
27 with relatively larger husband-older age gaps suffer from poor wellbeing and/or lower  
28 reproductive success. We find that spousal age gaps were unrelated to marital  
29 stability, suggesting it has no discernable negative or positive impact on happiness  
30 with a marriage. Arguably marital stability may present a weak test of sexual conflict  
31 if controlling men prevent women from leaving unhappy marriages. Yet prior studies  
32 of this population indicate lack of affection and undesirable male behaviors are  
33 common grounds for divorce, suggesting women are active agents in the termination  
34 of marriages. In a 1996/7 survey of 314 divorced women from Kisesa, Boerma et al.  
35 (2002) report that alcoholism of the husband (38%), lack of love (31%), unfaithfulness  
36 (27%), and violence (24%) were the most common reasons for divorce, followed by  
37 non-payment of bridewealth (7%) and infertility (3%). Our findings here also indicate  
38 that divorce is more common among informal marriages and where bridewealth is  
39 unpaid, consistent with the notion that such marriages are relatively weaker unions to  
40 begin with. Bridewealth payments may also act to increase economic incentives and  
41 social obligations to remain married.  
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4 We also observe husband-older relationships have no discernable costs to women's  
5 wellbeing and reproductive success. In fact, compared to women who are the same  
6 age or older than their husband, those married to older men had higher  
7 empowerment, and compared to women married to younger men, those with older  
8 husbands had better mental health. This finding could be taken as evidence of  
9 husband older marriages in general benefiting women, and is consistent with a study  
10 in South Africa, where women reported a preference for older males as mates  
11 because they are perceived to be more respectful and less violent than men closer in  
12 age (Beauclair & Delva, 2013). However, among the overwhelming majority of women  
13 with an older husband, incremental increases in spousal age gap are not related to  
14 either measure of wellbeing or to fertility, suggesting that this reflects a qualitative  
15 distinction between women who do and do not follow strong social norms of husband-  
16 older marriage. There is no evidence that relatively larger husband-older age gaps  
17 benefit women among those that do marry older men. On the basis of our available  
18 data we therefore conclude that relatively large husband-older spousal age gaps are  
19 generally neither costly nor particularly beneficial in this population in terms of  
20 empowerment, mental health or fertility. Intriguingly, the minority of women whose  
21 parents choose their partner had relatively high wellbeing. We are hesitant to  
22 interpret this pattern without further supporting data, but future research should  
23 consider potentially differing expectations of married life, and consider how kin  
24 involvement in the marriage process relates to wider patterns of emotional and  
25 economic support from kin which may impact women's wellbeing.

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46 The interpretation of our results comes with several important caveats. First, while  
47 we document differences in ideal spousal age gap, our analyses do not enable us to  
48 measure the strength of such preferences in comparison to other traits. Stated ideals  
49 may also reflect latent assumptions about ideal circumstances of marriage, rather  
50 than individual preferences per se. It is possible therefore that discrepancies between  
51 ideal and actual gaps are not especially meaningful. Second, our study can only tell us  
52 about the observed range of age gaps, and so we cannot make conclusions about more  
53 extreme husband-older marriages (e.g. of 15+ years), which are relatively unusual in  
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4 this population. Third, our cross-sectional analysis cannot definitively establish  
5 causality in observed relationships. It would be ideal for future studies to revisit the  
6 relationships discussed here utilizing longitudinal analysis to investigate the possibility  
7 of selection bias. This could occur, for example, if a woman's pre-marital  
8 characteristics influence her choice of marriage partners, as has been demonstrated  
9 in studies of polygyny (Lawson & Gibson 2018). Finally, our conclusions rest on a  
10 limited number of wellbeing indicators. For example, our measure of mental health is  
11 notably limited to depressive symptoms. Future research is thus required to fully  
12 access evidence for potential wellbeing (or fitness) consequences of marriage to older  
13 men for women, and the hypothesized benefits of husband-older marriages for men.  
14 Sexually transmitted infections, including HIV, may be particularly relevant in this  
15 context, since sex with older men (who have had more pre-marital sexual partners) is  
16 a key transmission risk for young women (Boerma et al. 2002).  
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#### 29 4.2 Why are women in same-age/wife-older marriages disadvantaged? 30 31

32 Women primarily reported ideals for husband-older marriages, a view reinforced in  
33 focus group discussions (Schaffnit, Urassa, et al. 2019), indicating that husband-older  
34 marriage represents a strong social convention in this population. We found that  
35 women in wife-older marriages had relatively poorer mental health and lower  
36 empowerment than those in husband-older marriages. This result rests on a small  
37 sample of women who married similar aged or younger men in this population, yet is  
38 complimented by several studies from other cultural contexts which come to similar  
39 conclusions albeit considering different wellbeing outcomes. This includes studies  
40 wherein women in wife-older marriages have been found to be more likely to suffer  
41 from depression (Kim et al., 2015) and experience intimate partner violence  
42 (Adebowale, 2018; Hindin, Kishor, & Ansara, 2008; Jewkes, Levin, & Penn-Kekana,  
43 2002; Kishor & Johnson, 2005; Otieno, 2017).  
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55 During data collection in 2017, we observed that female Tanzanian research assistants  
56 remarked on wife-older pairings as embarrassing or shameful, suggesting costs of  
57 norm violation may contribute to disadvantages for women in wife-older marriages.  
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4 Men in wife-older marriages were seen as ‘push-overs’ and their wives stereotyped as  
5 forceful or controlling. Our ongoing research on marriage in this population also  
6 reinforces this interpretation. In a focus group discussion with women aged 19-24  
7 conducted in 2019, one participant reflected on the undesirability of having a younger  
8 husband: *“Maybe you find a man is older than a woman and there would be respect  
9 present, but if a woman is older than a man then the marriage is difficult. For  
10 example, a woman who is 22 years old - she is supposed to be married to a man who  
11 is five years older, 28 or 30 years. They will settle. But if you say a woman is to be  
12 older than a man, respect will not be there. The woman will be seeing the man is  
13 very young and respect [of the husband] will decrease”*. Similarly, an unmarried 18-  
14 year old woman said during an in-depth interview: *“Say maybe I am 25 years old. It  
15 doesn’t mean I will get married to a man who is either 26 or 27 because it means we  
16 will always be fighting. So, looking at my age, I will take a man who is at least 30.”*  
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29 These observations suggest that women who marry younger men face judgement from  
30 their peers, and may experience more conflict within a marriage, which could in turn  
31 adversely impact mental health. Lower empowerment among women in wife-older  
32 marriages could come about, for example, if their husbands behave in more violent or  
33 controlling ways in order to counteract stereotypes of weakness or passivity.  
34 Alternatively, causal relationships between poor wellbeing and wife-older marriages  
35 may go in the opposite direction. For example, women with pre-existing mental  
36 health vulnerabilities may have low success on the marriage market, and  
37 consequently will be more likely to accept undesirable marriage arrangements,  
38 including marriage to a relatively young man who may himself also be relatively  
39 disadvantaged. These possibilities are not easy to disentangle without data on women  
40 and men’s wellbeing both prior to and following marriage.  
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### 52 4.3 Making sense of wider trends

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55 Our findings contrast with widespread assumptions in global health and applied social  
56 science where relatively large age discrepancies are frequently conceptualized as  
57 harmful for women (Girls Not Brides, 2019; Pyke & Adams, 2010; UNFPA, 2012). Here,  
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4 male-older spousal age gaps are viewed as both a symptom and a cause of unequal  
5 power dynamics ultimately favoring men at a cost to women’s wellbeing (Carmichael,  
6 2011; Kishor & Johnson, 2004). Supporting this account, there is some evidence that  
7 women in relationships with large spousal age gaps experience higher mortality than  
8 women paired with a similarly aged spouse (Klinger-vartabedian & Wispe, 1989,  
9 Drefahl 2010). However, in addition to our findings, a sizeable number of studies  
10 indicate that, despite common assumptions, husband-older marriages are not  
11 predictive of harm in other domains, most notably intimate partner violence  
12 (Adebowale, 2018; Hindin et al., 2008; Jewkes et al., 2002; Kishor & Johnson, 2005;  
13 Otieno, 2017).

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23 An alternative possibility is that the “pathological view” (Pyke & Adams 2010) of  
24 husband-older marriages may exaggerate or misidentify underlying trends. Supporting  
25 this conclusion, our own review of the literature indicates mixed findings. As  
26 mentioned, intimate partner violence, an outcome not assessed in this study, is often  
27 noted to be *less* common in relationships where males are older than females  
28 compared to in age-similar or wife-older relationships (Adebowale, 2018; Hindin,  
29 Kishor, & Ansara, 2008; Jewkes, Levin, & Penn-Kekana, 2002; Kishor & Johnson, 2004;  
30 Otieno, 2017). Qualitative work on power dynamics in age disparate relationships also  
31 calls into question whether greater age gaps in male-older relationships are invariably  
32 indicative of a male-favored power balance (Pyke & Adams, 2010). False support for  
33 sexual conflict over spousal age gap may also occur as large spousal age gaps tend to  
34 be confounded by alternative risk factors for poor wellbeing. Indeed, isolating spousal  
35 age gap as a driver of women’s wellbeing is complicated by the tendency for large  
36 husband-older spousal age gaps to covary with other relationship-level characteristics  
37 that may not always serve women’s interests, including early and polygynous  
38 marriages (Barbieri et al., 2005), and simply by virtue of the exaggerated distribution  
39 of male-older marriages in relatively low-income and less gender equalitarian  
40 contexts (Carmichael, 2011).

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58 Nonetheless, while we do not find strong evidence for sexual conflict over size of  
59 spousal age gap in this population, we also do not find particularly strong evidence  
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4 that larger husband-older marriages are beneficial for women. This is relevant to the  
5 evolutionary social sciences, as many evolutionary studies of mate choice have largely  
6 failed to look beyond the apparent mutual compatibility of older men and younger  
7 women, underestimating the possibility of sexual conflict. Rather, evolutionarily-  
8 grounded research on age gaps is dominated by documentation of preferences, at the  
9 exclusion of considering how preferences are actualized, and/or measuring the  
10 proximate and ultimate consequences of age disparate relationships. Furthermore,  
11 while the topic of sexual conflict is well developed in animal studies, its application  
12 to human mating and marriage behavior has lagged (for review see Borgerhoff Mulder  
13 & Rauch, 2009). Illustrating this point, Conroy-Beam & Buss's (2019) recent and  
14 exhaustive review of age preferences in human mating pulls together an impressive  
15 compendium of findings demonstrating that women on average prefer older men, but  
16 does not raise the possibility that female fitness may nevertheless be better served by  
17 smaller age gaps than are optimal for men. Yet, even preference data alone points to  
18 potential for sexual conflict over partner age; it has long been recognized that while  
19 women generally state ideals for only modestly older men, men more typically desire  
20 considerably younger women, especially as they reach older ages themselves (Kenrick  
21 & Keefe, 1992). Such distinct preferences are logically incompatible and suggest  
22 sexual conflict is unavoidable.  
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#### 40 4.4 Conclusions

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43 Our study suggests that Sukuma women in northwestern Tanzania typically prefer to  
44 marry slightly older husbands, but frequently marry men older than their stated  
45 ideals. However, beyond this indicator of sexual conflict, there are neither obvious  
46 costs nor benefits associated with greater age gaps between a wife and her husband.  
47 In contrast, other aspects of the marriage - such as cowife status, the payment of  
48 bridewealth, the formality of marriage, and absolute age at marriage - are associated  
49 with, and are likely more important determinants of a woman's marital stability,  
50 mental health, empowerment and reproductive success. Thus, other than adhering to  
51 social conventions by avoiding younger husbands, we tentatively conclude that  
52 spousal age gap itself is largely of little consequence to the women we studied. While  
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4 seemingly neutral to women, husband-older marriages may nevertheless serve male  
5 fitness interests, with prior research demonstrating that early female marriage -  
6 linked to larger spousal age gaps - is predictive of higher reproductive success  
7 (Schaffnit et al. 2019). Observed spousal age gaps may also be a, at least partial,  
8 byproduct of mating market availability. Globally, the largest spousal gaps are found  
9 where polygynous marriage is common (United Nations, 2000). Polygyny leads to a  
10 relative shortage of unmarried women, which may in turn motivate men to look for  
11 relatively younger women as marriage partners. Whatever the case, the findings of  
12 this study are unlikely to be universally generalizable and we caution that a wider  
13 global and public health literature routinely emphasizes potential for sexual conflict  
14 over spousal age gap in other cultural contexts. We conclude by recommending that,  
15 often implicit, assumptions about the mutual compatibility of male and female age  
16 preferences in the evolutionary human sciences on the one hand, and assumptions  
17 about the harms of husband-older marriage in public health on the other, are further  
18 examined at both the theoretical and empirical level. As highlighted by Borgerhoff  
19 Mulder & Rauch (2009) a decade ago, we still know surprisingly little about the extent  
20 of sexual conflict in human mating and marriage.  
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### 36 Author contributions

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39 D.W.L. and S.B.S. conceptualized and designed the study. S.B.S., A.H., D.W.L. and  
40 M.U. collected the data. S.B.S. conducted the data analysis. D.W.L. & S.B.S. wrote the  
41 manuscript. A.H. and M.U. contributed to editing the manuscript.  
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4 University of California, Santa Barbara.  
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## 7 Data Availability

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10 The data associated with this research are available upon request to the authors,  
11 provided the planned analysis is first approved by NIMR, Mwanza, satisfies their  
12 concerns regarding subject anonymity, and due credit is given to NIMR in the co-  
13 production of the data. The authors can facilitate this approval process on request or  
14 NIMR can be approached directly.  
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## 35 Figure Captions

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39 **Figure 1:** Histograms showing (A) actual (median = 6) and ideal (median = 3) spousal  
40 age gaps among ever married women, and (B) ideal spousal age gaps among ever  
41 (median = 3) and never married (median = 2) women; vertical, dotted lines indicate  
42 median ideal/actual spousal age gaps.  
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48 **Figure 2:** Odds ratios from logistic regression predicting still being married to first  
49 husband (n=491). Model controls for all variables plotted, current age, and whether  
50 the marriage was formal or informal (see Supplementary Material). 95% confidence  
51 intervals are illustrated.  
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57 **Figure 3:** Relationships between empowerment score (A, D), mental health score (B,  
58 E), and age-adjusted fertility (C, F) and spousal age gap for currently married women  
59 showing raw data (A-C) and coefficients for spousal age gap and other union level  
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characteristics from regression models (D-F). Model output (D-F) controls for women’s current age, place of residence, and shown union-level variables (see Supplementary Material). 95% confidence intervals are illustrated. Note “Woman+” refers to women who choose their partner alone or with another person.

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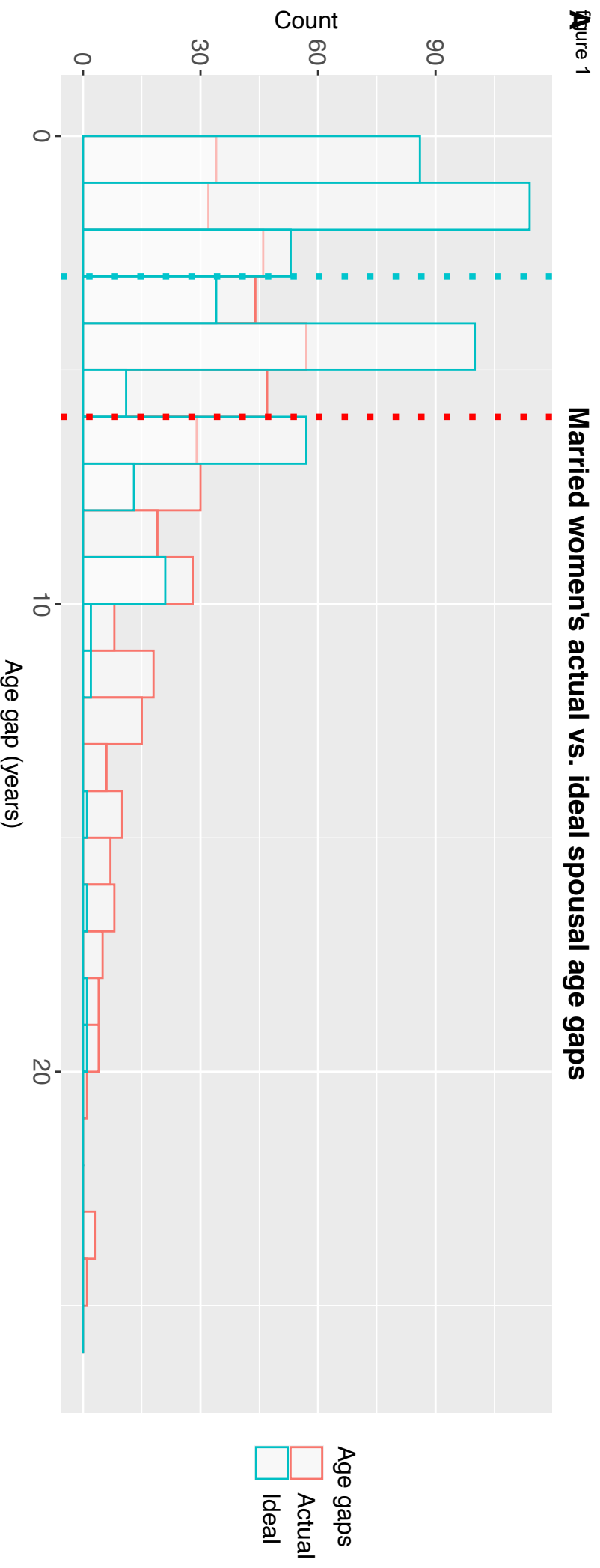
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Figure 1



**B**

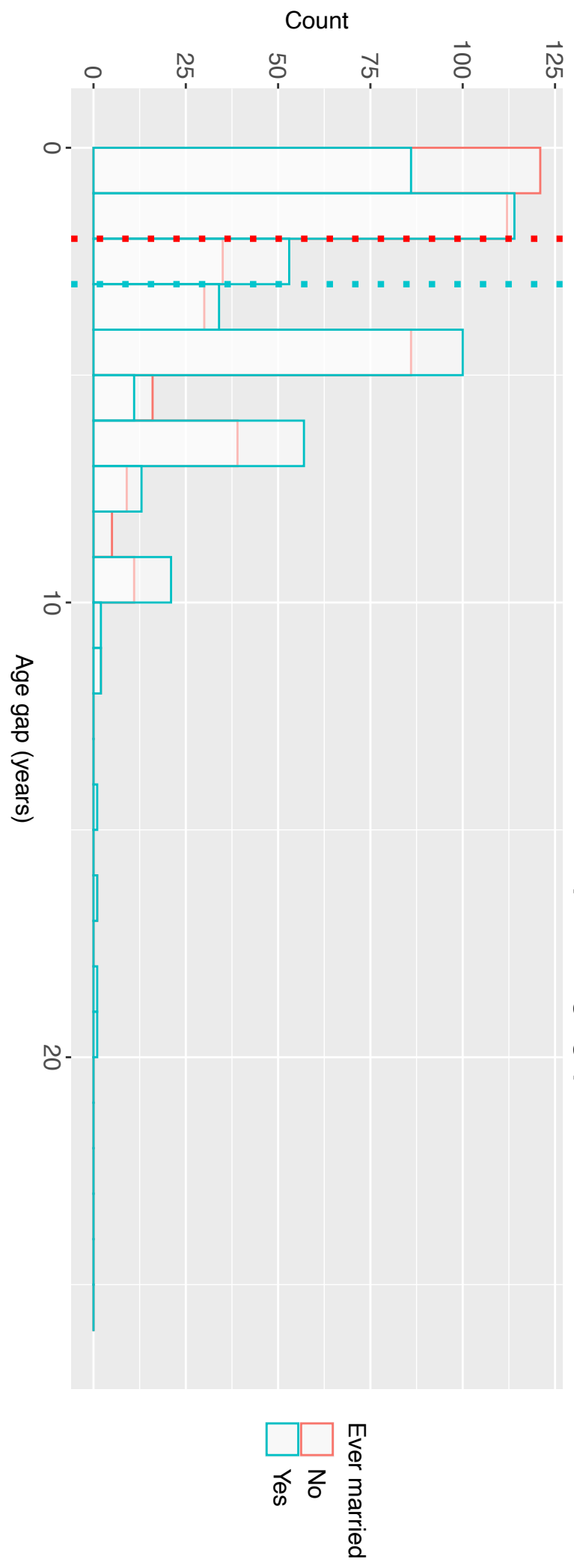
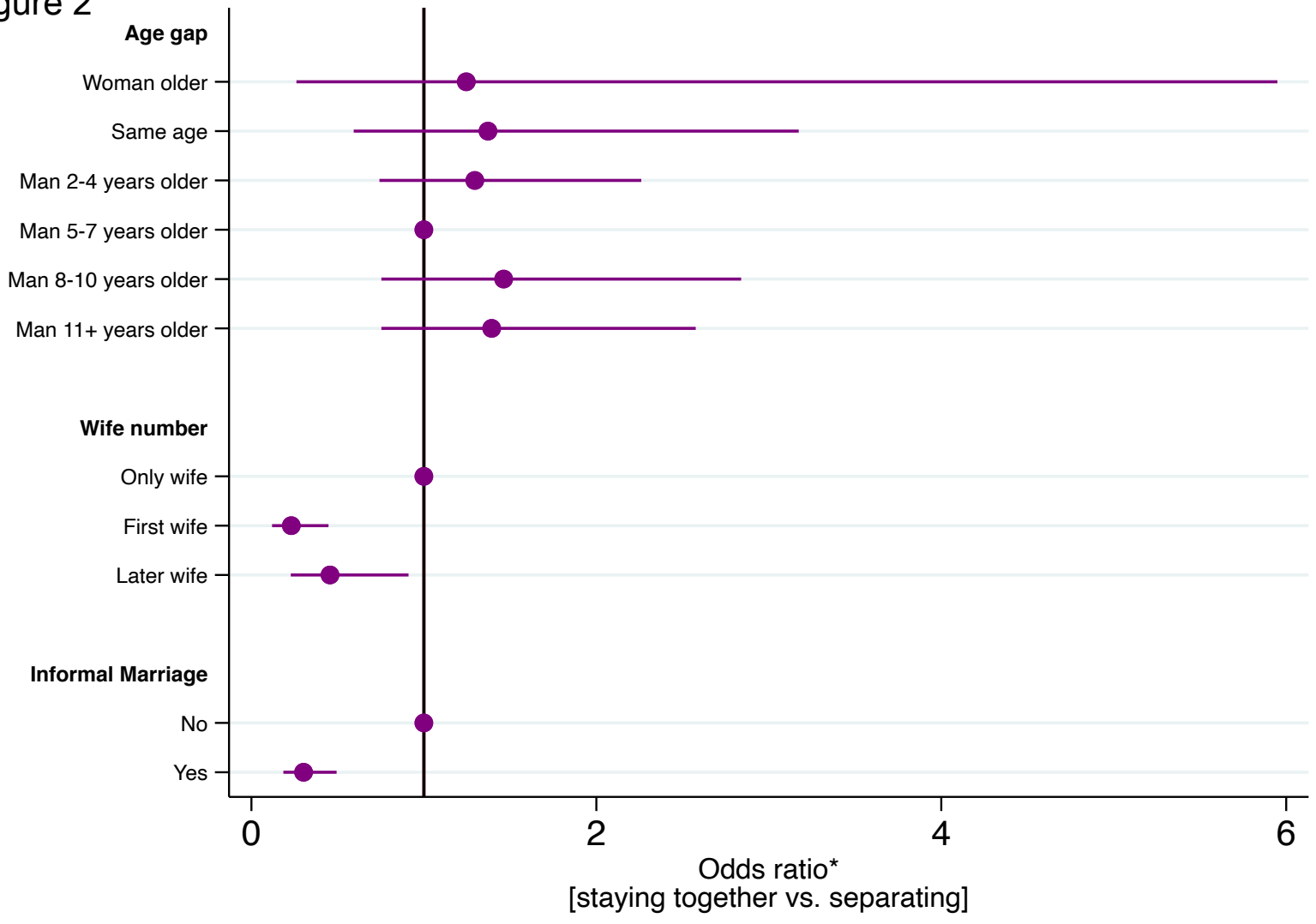
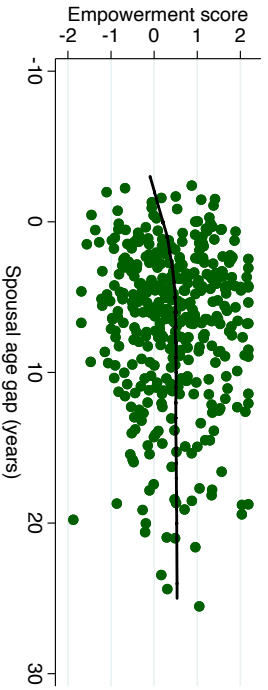


Figure 2

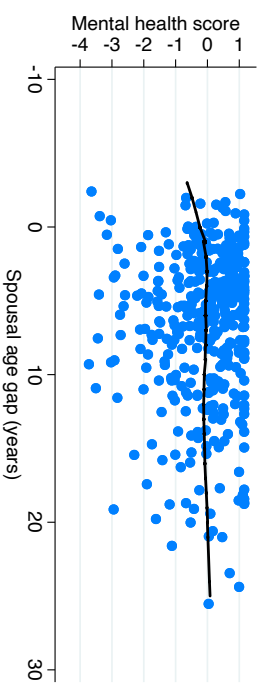


\*for first marriages; controlling for variables shown and age and informal marriage

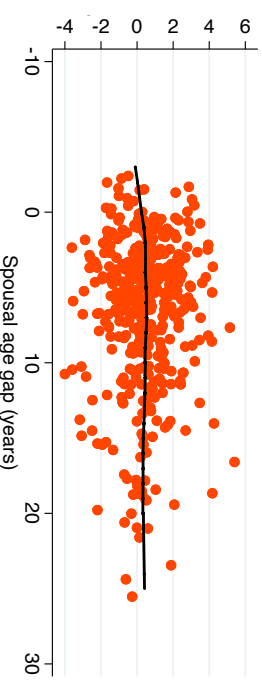
**Figure 3** Empowerment Score



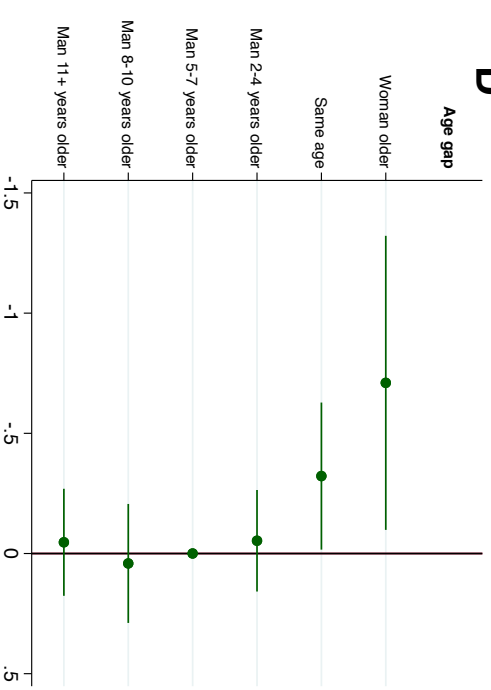
**B** Mental Health Score



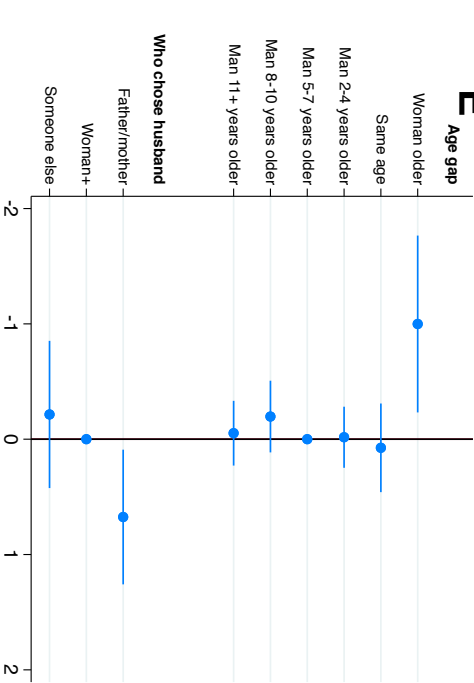
**C** Age-adjusted Fertility



**D**



**E**



**F**

